BUILDING 707/707A DECOMMISSIONING BASIS FOR INTERIM OPERATION (DBIO)

CHAPTER 2

FACILITY DESCRIPTION

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2. FACILITY DESCRIPTION

This chapter provides brief descriptions of the Building 707/707A Complex (referred to as Building 707/707A). As encompassed by this DBIO, Building 707/707A includes: Building 707/707A (original structure, Modules A through H), Building 707A (an annex, Modules J and K), Building 708 (utilities and emergency generator), Buildings 711 (cooling tower), Building 711A (emergency diesel pump), Building 718 (auxiliary shed), Building 731 (process waste pit), Building 732 (laundry waste pit), Building 778 (service building and all-weather access between Buildings 707/707A and 776/777), and associated ancillary structures. Also included is a summary of the operational history of Building 707/707A/778, in the context of the prevailing Rocky Flats Environmental Technology Site (Site) mission, noting significant historical events, issues, and facility and operational modifications.

Building 707/707A is located in the center of the Industrial Area of the Site, about 1,925-m from the Site's boundaries. Figure 2-1 shows the location of Building 707/707A in relation to the rest of the Site, and Figure 2-2 shows the specific buildings of the Building 707/707A Complex. More details of the entire Site and its physical characteristics can be found in the *Rocky Flats Environmental Technology Site SAR*.

Other factors relating to the Site and Building 707/707A that may contribute to the hazards and accident analyses include demography, local and regional meteorology, climatology, regional land- and water-use patterns, surface and subsurface hydrology, and geology (including seismology). Based on past and current analyses and documentation, those factors determined to have significant potential to influence the safety of the Building 707/707A operations include meteorology and geology. The Sitewide details are referenced in the *Site SAR* (Ref. 2-1).

The primary purpose of the summaries, descriptions, and illustrations presented in this chapter is to provide a general understanding of the underlying facility design bases and the structures, systems, and components (SSCs) that support the safe conduct of Building 707/707A processes during all phases of activities as defined in Chapter 4. Additionally, general and specific descriptions and illustrations are provided for the Site, Site activities (historical and current), Building 707/707A, and the Building 707/707A mission (historical and current).

The descriptions in this chapter show the configuration of systems at the time the DBIO was prepared. Portions of systems, or entire systems, will be modified or isolated, disconnected, and removed as the facility is dismantled. Ultimately, all equipment, systems, and structures (with the exception of some concrete pads) will be dismantled and removed or demolished. These changes are described and analyzed in this document. Since it is unreasonable, nor practical, to maintain the descriptions current as the work progresses, the system descriptions will not be updated to stay current with the actual facility configuration as closure progresses. Current system status and configuration information is maintained by Configuration Control Authorities (CCAs) and Engineering. As system configurations change during Closure activities they will be evaluated in accordance with the USQD process.

2.1 FACILITY MISSION

The vision for the future of the Site was originated in the *Final Rocky Flats Cleanup Agreement* (*RFCA*, Ref. 2-2). According to the RFCA, the following efforts are envisioned over the next few years:

- Achieve accelerated cleanup and closure of the Site in a safe and environmentally protective manner in compliance with applicable state and federal environmental laws.
- Ensure that the Site does not pose an unacceptable risk to the citizens of Colorado or to the Site workers from either contamination or an accident.
- Work toward the disposition of contamination, wastes, buildings, facilities, and infrastructure from the Site, consistent with community and national objectives.

Consistent with the scope of the Site closure mission, disposition of Building 707/707A requires removal of facility systems, decontamination of rooms and equipment (as necessary to ensure worker safety and to support waste disposal), and decommissioning and demolition of the facility and its supporting structures. To achieve this goal, the future Building 707/707A mission includes the following:

- Core Activities – those activities necessary to maintain the facility in a safe and habitable condition and to comply with government regulations.

- Closure Activities – those activities necessary for system isolation and equipment removal, decontamination, waste disposal (e.g., size reduction, neutralization, packaging, shipping), decommissioning and demolition.

These activities are further broken down and delineated in Chapter 4 of this DBIO.

2.2 FACILITY HISTORY

2.2.1 Original Mission

Building 707/707A was originally designed as a manufacturing facility for casting, fabricating, and assembling finished plutonium (Pu) parts. Operations in Building 707/707A that began in the early 1970s were divided into eight categories: casting, forming, metallurgy, machining, assembly, inspection, non-destructive testing, and support.

Operations began with Pu metal feedstock from various sources. The feed was cast into ingots of the required shapes that then proceeded through standard metalworking steps to become finished weapons parts. Finished Pu parts and parts made of other materials were assembled into subassemblies that were joined to become final assemblies. Inspection and testing of the parts, subassemblies, and final assemblies were ongoing throughout the entire production process.

2.2.2 Significant Changes to the Facility

With the suspension of nuclear production operations in 1989 and the subsequent discontinuation of the production mission in 1992, Building 707/707A has transitioned from a nuclear weapons production facility to an environmental restoration facility. In support of its previous and current activities, the Building 707/707A facility has undergone structural and operational modifications. The major impacts to Building 707/707A, are summarized in Table 2-1.

TABLE 2-1. SIGNIFICANT CHANGES TO BUILDING 707/707A COMPLEX

CIRCA	CHANGE
1980	• Addition of Building 711 Cooling Tower.
1981	• Replacement of Interruptible Power Supply (IPS) with UPS.
1982	• Installation of a second diesel generator (EGEN2).
1985	• Capacity increase for Fans F-117A & B.
1988	• Structural Upgrade of Building 707A.
1989	• Implement Resumption Pu production protocol. • Pu operations curtailed, and focus changed to environmental cleanup.
1989-1992	• Upgrade of vital safety systems (dump valves, fire panels, calibration). • Duct Remediation. • Physical Security Upgrade.
1995-1996	• Criticality Annunciation System upgraded to include the installation of a replacement, state-of-art Criticality Detection Panel in B750. • Draining and deactivation of B707/707A organic supply and drain/recycle systems.
1996-1998	• Strip-out of Module A and installation of Salt Stabilization process equipment [10 furnaces, in-line segmented gamma scanner (SGS) system in C-Cell]. • Strip-out and installation of Cal-gamma systems in Rooms 167, 169, and 171. • Strip-out and modifications to Module F, Rooms 181, 182, and 183 to support staging and packaging of salt residues. • Modifications to Modules D and E to support dry residue repackaging (D) and ash processing (E). • Strip-out for installation of Plutonium Stabilization and Packaging System (PuSPS) in Module J (installation was subsequently cancelled). • Setup of high efficiency particulate air (HEPA) filter and completion of HEPA filter testing. • Strip-out and removal of production equipment from Modules B, F, G, H, Second Floor, and Room 167 for shipment to LANL in support of the Stockpile Reliability Evaluation Program (SREP).
1998-2000	• Structural modifications/upgrades to Module K gloveboxes and installation of crushing and shearing equipment to support the SNM/Plutonium sizing, consolidation, and shipment programs (completed). • First-floor SAAMs (Selective Alpha Air Monitors) replaced with CAMs (Continuous Air Monitors). • Criticality Alarm & Production Annunciation Systems Upgrade project installation to upgrade the Life Safety/Disaster Warning (LS/DW) System in Building 707/707A Complex. • Plant Fire Security Replacement (PFSR) installation to upgrade the fire detection and alarm systems in the Building 707/707A Complex.
2001	• Elimination of MAA • De-Inertion of Systems • Removal of B-Boxes, hoods and downdrafts • Removal of glovebox overheat detection in D and E Mods

2.2.3 Significant Historical Events/Issues

2.2.3.1 Significant Abnormal Occurrences and Accidents

Since operations began in Building 707/707A, various databases were maintained to track significant accidents and occurrences in Building 707/707A. A thorough review of these databases and facility documents was performed during the development of the Revision 1 BIO. For this DBIO, however, the review was limited to those events that occurred since the implementation of Revision 1. While all off-normal, unusual, or accident conditions described in the databases were reviewed, the events identified in Table 2-2 were considered significant enough to Building 707/707A to require varying degrees of consideration in the hazards and accident analyses and/or control set documented in this DBIO. Utilizing the knowledge of the Site and Building 707/707A Subject Matter Experts (SMEs), events summarized in Table 2-2 was selected based on impact to the activities to be authorized, per implementation of this DBIO. Events that do not contribute to the identified hazards associated with the analysis of the activities and systems described in this DBIO were not considered significant for inclusion.

TABLE 2-2. ABNORMAL/ACCIDENT EVENTS OF SIGNIFICANCE THAT HAVE IMPACTED BUILDING 707/707A

DATE	LOCATION	SUMMARY DESCRIPTION
03/04/70	707/707A, East Hall	Spark from gas cutting torch ignited combustibles.
04/20/70	707/707A, East Hall	Electric air duct heater shorted.
07/28/70	707/707A	Loss of electric power to control panel on the floor created extreme negative pressure in the building. Two temporary sheetrock barricades were breached. No injuries or contamination spread.
01/16/71	707/707A, Module E	Electrical fault ignited wiring insulation.
03/01/71	707/707A, Module E	Pu fines within a vacuum cleaner ignited.
03/04/71	707/707A, Module E	Pu fines within a vacuum cleaner ignited.
04/11/72	707/707A, Module K, Glovebox 75	A small piece of burning Pu fell from a burned out crucible when moving the crucible from the heat source. The Pu melted through the glovebox and contaminated the area.

TABLE 2-2. ABNORMAL/ACCIDENT EVENTS OF SIGNIFICANCE THAT HAVE IMPACTED BUILDING 707/707A (concluded)

DATE	LOCATION	SUMMARY DESCRIPTION
04/19/83	707/707A, Module J, Glovebox J-10	During oxidation of Pu machining chips and waste material/residue in a furnace box, an explosion occurred. It is believed that a small amount of chlorinated hydrocarbon solvent was present and the cause of an exothermic reaction of sufficient proportions to cause the pressurization of the glovebox. Some of the material projected by the explosion caused mechanical damage to the box intake filter, permitting Pu to escape to the work area. The module was extensively contaminated, requiring decontamination efforts over a period of about 20 days.
09/20/85	707/707A	Water was released into glovebox because of a cooling water hose rupture. The distilled water was picked up and disposed of in degreaser pots containing CCl_4. During the next shift, normal degreasing run was made in these pots. Reaction caused a fire of chips in a glovebox.
09/21/85	707/707A	A rapid exothermic reaction between CCl_4/H_2O and Pu resulted in a fire in the box and some contamination to the room.
02/05/86	Module B	Oil in furnace caught fire when plastic line melted. Workers extinguished the fire.
04/22/87	Module J, Glovebox J-20	While attempting glove removal, Pu oxide under lip of glove was released in Module J. No downdraft unit was used prior to loosening any part of the glovebox gloves.
05/28/87	Module J, Glovebox J-60	At 325°C (598°F), gate valves opened to allow house air to enter and burning to begin. However, gases ignited and glovebox pressurized forcing the criticality drain to empty on the floor with some contamination.
09/04/87	Room 183	When opening the secondary containment on a shipment of metallographic samples, the operators realized the third inner bag was not sealed. 1,400 ft^2 of Room 183 was contaminated. Operators were contaminated on their hands and arms.
02/04/88	Module C	During briquetting, one batch was completed with no problem. However, after retracting press on a second batch, a small amount of Pu on top of ram caused binding and ignited the Pu. A small amount of CCl_4 caused a loud noise. Oxygen analyzer read 4.2% oxygen.

2.2.3.2 Significant/Open USQs and Safety-Related Findings/Events

In addition to the abnormal occurrences and accidents identified in Table 2-2, USQs and other safety-related findings/events may impact the hazards and accident analyses of this DBIO. Several reviews of past USQ and Justification for Continued Operations (JCO) evaluations have been conducted to determine those comprising part of the *Building 707/707A Authorization Basis Document List* (ABDL). The ABDL is found on the Site's Nuclear Safety & Licensing website. These reviews consisted of Sitewide and building-specific evaluations. The results of these reviews provide the starting point from which significant USQs and JCOs were selected (i.e., those requiring consideration in the hazards and accident analyses and/or control set documented in this DBIO). The collective results of these reviews, representing USQ Determinations (USQDs) and JCOs incorporated into the hazards and accident analyses and/or control set, are presented in Table 2-3. Copies of the complete evaluations can be obtained from Nuclear Safety & Licensing.

2.2.3.3 Insights from Other Facilities

Other safety/AB documents from Site buildings (in particular, B371/374, B771/774, B776/777, and B991) were reviewed to determine whether additional events/occurrences should be applied to the Building 707/707A Complex DBIO. When identified, such events/occurrences were factored into the hazards and accident analyses documented in Chapters 5 and 6.

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TABLE 2-3. USQ AND JCO EVALUATIONS OF SIGNIFICANCE TO BUILDING 707/707A

ID/NUMBER	TITLE	SUMMARY DESCRIPTION/STATUS
USQD-RFP-02.1238-ARS	10-Gallon Drum Leakage	A discovered condition involving assumptions associated with the permeability of 10-gallon drum seals and the probability of an explosion inside the drum. Requirements: None identified in the USQD. Compensatory Actions: None identified in the USQD. Disposition: This USQD is addressed under JCO-RFP-02.1255-VWH, and subsequent revisions, as discussed below.
JCO-RFP-02.1255-VWH	JCO To Allow Interim Storage Of 10-Gallon Drums That Have The Potential For Hydrogen Buildup	This JCO addresses the interim storage of 10-gallon drums that have the potential for hydrogen buildup until remediation activities (including movements necessary for venting or re-packing) are complete. Requirements: This JCO is a relevant to multiple facilities including Building 707/707A. The JCO required Building 707/707A to complete the Compensatory Actions described below prior to April 1, 2002. Compensatory Actions: The following Compensatory Actions were invoked in the JCO: 1. Work involving unvented suspect drums will be discontinued, with the exception of drum venting or re-packing activities and drum movements for the purpose of venting or re-packing. 2. No spark, heat, or flame-producing work will be conducted within 35 feet of unvented suspect 10-gallon drums unless the hot work area and drums are separated by a firewall. 3. Walkdowns will be performed to verify that required combustible controls are effectively implemented in affected areas outside of approved storage vaults once per day. 4. A procedure governing the venting or re-packing of the suspect drums will be utilized to ensure that the activity is performed in accordance with the Integrated Safety Management (ISM) philosophy. Disposition: A hydrogen deflagration in a 10-gallon drum scenario has been added to the Explosion Accident Analysis presented in Chapter 6 of this DBIO

TABLE 2-3. USQ AND JCO EVALUATIONS OF SIGNIFICANCE TO BUILDING 707/707A (continued)

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ID/NUMBER	TITLE	SUMMARY DESCRIPTION/STATUS
DCS-707-02-2342-KWG	High Americium Drum Transfers at Building 707, Drums D94847 and DD3996	A discovered condition involving non-compliance with the assumptions of the facility AB safety analyses. The subject drums contain relatively high amounts of Am in combination with Pu that exceed 250 g of aged weapons grade equivalent Pu Requirements: None identified in the DCS since the subject drums are no longer in the facility. Compensatory Actions: Immediate corrective actions involved ensuring that better information is available prior to shipment regarding the actual material at risk in drums being transported out of the facility. An Operations Order is being prepared to ensure the continued screening for material suspected of containing elevated Am concentrations for high resolution scan prior to shipment. Disposition: This DCS is addressed under USQD-707-02.2352-KWG as discussed below.
USQD-707-02.2352-KWG	High Americium Drum Transfers at Building 707, Drums D94847 and DD3996	This USQD addresses the Discovered Condition presented above. The USQD concluded that a USQ exists for drums containing elevated Am concentrations beyond those calculated in the explosion scenarios present in the DBIO. Requirements: None identified in the USQD. Compensatory Actions: No new compensatory actions were identified beyond those committed to under the DCS. Disposition: A hydrogen deflagration in a 10-gallon drum scenario has been added to the Explosion Accident Analysis presented in Chapter 6 of this DBIO. However, programmatic controls will continue to be required to account for elevated Am concentrations during waste packaging activities to ensure that the material at risk assumptions are not compromised.

2.3 FACILITY DESCRIPTION

As described and illustrated in Figure 2-1, Building 707/707A is located near the center of the Site perimeter inside the former Protected Area (PA). The Complex includes the Building 707 original structure (Modules A through H), Building 707A (an annex, Modules J and K), Building 708 (utilities and standby generators), Building 711 (cooling tower), Building 711A (emergency diesel pump), Building 718 (auxiliary shed), Building 731 (process waste tanks), Building 732 (laundry waste pit), Building 778 (service building and all-weather access between Buildings 707/707A and 776/777), and other outside SSC.

Building 707/707A is a two-story building with a single-story section on the East Side. The building is constructed primarily of pre-cast, pre-stressed concrete panels supported by a concrete column and beam frame. The main floor of Building 707/707A is divided into eight modules, with two more modules located in Building 707A. Equipment supporting first floor operations (e.g., pumps and tanks) is located on the second floor of Building 707/707A. The single-story section on the East Side is not considered a radiation area. The basement room of the building contains deactivated machine oil storage tanks that are maintained in a stable condition by hydrogen sampling and periodic nitrogen purging. In the following subsections, general descriptions of the Building 707/707A design bases/criteria, SSCs, and major functional areas are presented. The primary purpose of these descriptions is to define the physical environment that bounds the activities for which the hazards and accident analyses documented in Chapters 5 and 6 of this DBIO were performed.

2.3.1 Building 707/707A

The major structures of the Building 707/707A Complex are Building 707, Building 707A (Annex), and outside facilities. The Outside Facilities that support Building 707/707A consist of the following buildings, structures, and components:

- Building 708 is located about 50 feet south of Building 707/707A. The building is a single-story, windowless, twin-tee structure. The structural design is based on the criteria for Building 707/707A. The foundation consists of: reinforced concrete individual spread footings that support perimeter concrete grade beams; pre-cast concrete T-bearing walls; vertical pre-cast T-walls supporting a concrete T-roof slab topped with poured concrete and finished with Neoprene Hypalon® roofing; and a concrete floor slab on grade. The building consists of a single open room housing heavy equipment and a single office. Four personnel doors and two large equipment doors (steel, roll-up, wall-face mounted, and electrically operated) provide access to the building.

- Building 711 is located about 60 feet southwest of Building 707/707A. Building 711 is a wooden, forced-draft, cooling tower that contains a dry-pipe deluge system for fire protection. Building 711A is a diesel-powered backup pump and fuel storage tank, and it is considered part of Building 711.

- Building 718 is located adjacent to Building 711 on the southwestern end of Building 707/707A. Building 718, also called the auxiliary shed, contains the fire protection deluge system for Building 711. The batteries for Building 711A are located in Building 718.

- Building 731 is located adjacent to Building 707/707A on the East Side. Building 731 is a process-waste pit, both above and below grade, and is constructed of reinforced concrete (walls, floor slab, and roof slab), with a reinforced concrete stairway inside leading to the bottom of the pit. The building houses two 1650-gallon process drain collection tanks and associated equipment for pumping these tanks.

- Building 732 is located northwest of Building 778. Building 732 is a laundry-waste pit, constructed above and below grade and has reinforced concrete construction (walls, floor slab, and roof slabs) with a reinforced concrete stairway inside leading to the bottom of the pit. The building houses one 1000-gallon process drain collection tank and associated equipment for pumping the tank. Building 732 and associated equipment are no longer used.

- Building 778 is located between Building 707/707A and Building 776/777. Building 778 is 50 feet wide by 514 feet long and is divided into rooms by concrete block walls and movable partitions. It provides services to the Building 707/707A Complex. Included in the structure area are a laundry (out of commission), an electrical shop, a pipe fitter's shop, a maintenance shop, and employee locker rooms and showers. The building has metal exterior walls and is constructed of reinforced concrete slab. The roof is metal sheathing with insulator pads inside. Two enclosed corridors provide all-weather accesses to Buildings 707/707A and 776/777. Building 778 is traversed by an overhead sealed chainveyor that transported radioactive material during the previous facility production mission. Due to Building 778's location within the 12-rad boundary of both Building 707/707A and 776/777 and, the presence of hold-up material within the chainveyor section transversing the facility, relevant safety structures, systems, and components are discussed below.

- Building 707/707A Outside Components and Support Buildings include items of equipment located outside but directly adjacent to Building 707/707A (e.g., tanks and cylinders), 707S (storage shed), and electrical transformers.

The relative locations of the buildings and structures comprising the Building 707/707A Complex and the outside facilities are shown in Figure 2-2. Summary descriptions of the structural attributes of the Building 707/707A including foundation, walls, floors, ceilings and roofs, and openings (doors and windows) are presented in the remainder of this subsection.

2.3.2 Facility Structure

Structural design criteria are based on natural phenomena forces that could affect structural integrity and operational continuity, such as seismic events, straight winds/tornadoes, wind-driven missiles, flooding, lightning, meteorites, snow loading, and freezing temperatures. Buildings 707/707A, 708, and 778 were constructed before general plant design criteria were developed. Therefore, all structures, systems, and equipment were designed to codes, standards, and specifications in effect at the time of construction (i.e., ~1970), that were, in general, less stringent than those currently used for designing plant structures.

After the *Final SAR – Building 707* (707 FSAR) (Ref. 2-3) was approved in 1987, Building 707A was structurally upgraded to the UCRL-15910, *Design and Evaluation Guidelines for DOE Facilities Subjected to Natural Phenomena Hazards* (Ref. 2-4) design basis earthquake of 0.21-g surface acceleration. Also upgraded was the design basis for winds of 161 mph for the process areas, but the upgrade did not include the second floor roof. Equipment and the remainder of Building 707/707A were not seismically upgraded because of budgetary constraints. (Refer to Table 2-1 for identification of other changes to Building 707/707A.)

General Construction and Foundation

Building 707 is a two-story building with a single-story section on the East Side. The building is divided into two sections by an expansion joint at column line 9, in the north-south walls, second floor, and roof. Abutted on the northwest side of Building 707 is a freestanding, two-story annex (Building 707A) that has its own separate east wall but is considered part of Building 707. The foundations for the buildings are cast-in-place concrete caissons and grade beams. The caissons have concrete caps, are cast in holes drilled into bedrock, and are connected by reinforced concrete tie beams. Structural framing is a pre-cast, pre-stressed concrete twin-tee roof and second floor, supported on pre-cast concrete beams, girders, and columns. The first floor consists of a structurally supported (i.e., I-beams) concrete slab on grade, and the basement areas are cast-in-place concrete. The process vaults are reinforced concrete extending from below grade to the second floor.

The below-grade exterior surfaces of the columns, pre-cast panels, concrete walls, concrete block walls, and the top 6 inches of the exterior surfaces of the perimeter-grade beams and footings are covered with coal-tar, water-proofing pitch. A 0.010-inch thick, polyethylene vapor barrier is installed under the floor slabs. Joints in exterior pre-cast concrete panels are caulked with silicone sealant.

Walls

The exterior walls of the buildings are predominantly vertical standing, pre-cast, pre-stressed concrete twin-tee panels. Pre-cast concrete columns are used to support girder loads. The inside surface of the exterior walls is furred (providing an air gap), insulated, and covered with gypsum board facing, except for the top 6-to-18 inches that is (from appearances) fiberglass thermal insulation (that effectively renders the fire resistance afforded by the air gap and gypsum board null). Although the portions of the concrete twin-tee walls that have the gypsum and furring strips will provide 2-hour fire endurance, the upper portions of the wall only support a fire endurance of about one-half hour. Moreover, even though such walls cannot be certified as a 2-hour fire barrier, they do provide a means of limiting fire and smoke spread.

Concrete masonry shear walls are located along the south walls on the ground floor and at the same relative location on the second floor and at column lines 7 and 11 (east-west). Design for wind and seismic lateral loads relies on the masonry shear walls and the pre-cast concrete; twin-tee wall sections provide design support for wind and seismic lateral loads.

The wall separating the single-story section from the two-story part of Building 707/707A is full-height, filled 8-inch concrete block. The exterior walls of the second floor of the two-story part of Building 707/707A are of twin-tee construction. They provide 2-hour fire resistance based on the two concrete block walls with an air gap, constructed to replace the concrete tee construction. The walls around the elevator shaft and the three stairways to the second floor are also full-height, filled 8-inch concrete block. The wall separating Buildings 707 and 707A consists of two twin-tee walls with an air gap. However, only the second story portion of the connecting wall provides a 2-hour fire resistance, because the first floor has conveyor penetrations through the walls. Therefore, while the first floor portion of this wall does not provide 2-hour fire resistance, it does provide a means of limiting fire and smoke spread.

The walls of the production modules are steel studs covered with 5/8-inch gypsum board, finished with 4-ft high, 1/4-inch hardboard wainscot. Other interior walls (as in offices and restrooms) are of comparable steel-stud construction, but the covering varies (e.g., enamel paint, glazed ceramic wall tile). Portions of the concrete twin-tee walls provided with the gypsum and furring strips can be credited with 2-hour fire endurance; however, the upper portions of the walls are credited with about one-half hour.

The Module H process vaults in Building 707/707A consist of poured-in-place concrete, with walls up to 42-inches thick. The storage vaults have walls of either poured-in-place concrete or filled concrete block. The interior of the X-Y retriever in Module K is lined with stainless steel.

Floors

The ground-level floors are 6-inch thick, reinforced concrete slabs and are structurally supported on beams and compacted sand and gravel sub-bases. The second floors are pre-cast, pre-stressed concrete twin-tee panels with a 3-inch thick concrete overcoat. The second floor is supported by pre-cast concrete inverted T-beams on pre-cast square concrete columns.

Office area floors are finished with resilient floor tile, although some areas are covered with indoor/outdoor carpeting. Restroom and shower floors have unglazed ceramic floor tile. The second-story floor is covered with a clear sealant. All floors in the production areas are finished with coatings designed to facilitate decontamination. The floors of Modules A, B, C, D, E, F, J, K, and the basement under the end of Module C are coated with an epoxy finish. The floors of Modules G and H are finished with a cementitious hardener and sealed. Floors of emergency showers and corridors surrounding the production modules have been coated with epoxy finish.

Ceilings

Interior ceilings are exposed structure, suspended ceilings, metal pan ceilings, or hardboard ceilings. The suspended ceilings are present in the office areas and laboratories in the single-story section, the corridors on the East Side of corridor F, and the office and control room on the second floor. Most of the modules have air-diffusing, metal-pan suspended ceilings. All restrooms and janitorial closets have suspended gypsum board ceilings. The remainder of the building has no suspended ceilings, and there are no ceilings in the second floor mechanical equipment areas.

Roofs

The roof decks are pre-stressed, pre-cast concrete twin-tee panels covered with a 2-inch thick, lightweight concrete topping. Insulation is installed over the topping, and a grid of 2 x 4-inch wood covered with 3/4-inch plywood covers the insulation. An elastic roofing material (Neoprene Hypalon®) forms the weather surface. Pre-cast concrete, inverted T-beams on pre-cast square concrete columns support the roof decks. The roofs have a uniform slope across the widths of the buildings. All roof water drains through roof drains and interior downspouts to grade.

Doors and Windows

Exterior doors are safety glass in metal frames; interior doors are metal with small (safety) glass windows. All doors located in fire-barrier walls are rated and labeled in accordance with applicable National Fire Protection Association (NFPA) standards. Dock doors in the shipping and receiving area are the steel roll-up type, wall-face mounted, and operated by electric motors.

There are no windows in the exterior walls. Most interior windows are clear, laminated plate glass in steel frames. There are special 10-inch thick water windows in the walls of the X-Y Retriever. These consist of 7-1/4 inches of water between two plates of laminated glass.

2.3.3 Description of Facility Systems and Components

The following general descriptions provide a brief introduction to the major SSCs that comprise the Building 707/707A Complex that encompasses Building 707 (original structure, Modules A through H), Building 707A (an annex, Modules J and K), Building 708 (auxiliary equipment), Building 711 (cooling tower), Building 711A (emergency diesel pump), Building 718 (cooling tower auxiliary shed), Building 731 (process waste pit), Building 732 (laundry waste pit), Building 778 (service building), and other outside SSC. Safety Class and/or Safety Significant SSCs specifically credited (in the analyses described in Chapter 7 of this DBIO) for the prevention and/or mitigation of accidents postulated for Building 707/707A are discussed in Appendix A, TSRs, of this DBIO.

2.3.3.1 Confinement Enclosure System

Gloveboxes are metal enclosures that provide primary confinement barriers for radioactive material. The gloveboxes are fitted with windows and gloveports with long protective gloves that allow workers to perform tasks within the glovebox while preventing direct exposure to materials and airborne contamination. Gloveboxes are normally maintained at a lower pressure than the surrounding environment by the associated ventilation system.

2.3.3.2 HVAC (Heating, Ventilating, and Air Conditioning) Systems

The Building 707/707A HVAC Systems were designed to provide the following functions:

- Prevent the release of airborne radioactive material from the building.
- Prevent the dispersion of radioactive materials into occupied areas of the building.
- Provide suitable air for process D&D operations.
- Furnish properly conditioned air for personnel comfort and process control.

Zones of increasingly negative pressure are established by controlling exhaust and supply airflows. Cascading negative differential pressures (d/Ps) cause air to flow from areas of lowest to areas of highest potential contamination, thereby insuring that radioactive contamination will not migrate to less contaminated areas.

Zone I is maintained at the lowest pressure (i.e., greatest d/P to atmosphere) and provides ventilation for the primary enclosures where radioactive material is handled (gloveboxes, the X-Y Retriever, and other enclosures that contain high levels of radioactive material). Zone II provides for secondary confinement in areas containing Zone I equipment and adjacent areas by maintaining an intermediate d/P between Zone I and atmosphere. The normally uncontaminated offices and corridors in the east bay of the building are also considered Zone II even though they do not contain Zone I equipment. The pressure in the offices and corridors is generally greater than that in the modules, but less than the outside atmosphere such that airflows from the offices and corridors into the modules.

The following five HVAC Systems are in Building 707/707A:

- General Dry Air System (Zone II).
- Inert Ventilation System-de-inerted (Zone I).
- Glovebox Dry Air System (Zone I).
- Dryroom Dry Air System (Zone II supply exhaust).
- J-Air System (Zone I Exhaust).

Figure 2-3 is a simplified diagram of the Building 707/707A HVAC Systems. The functions of these systems, as well as their significant features and components, are discussed in the following subsections.

General Dry Air System

The General Dry Air Supply System supports Zone-II areas within Building 707/707A by providing filtered and temperature-controlled air and by maintaining a negative pressure relative to atmosphere. This system also provides HEPA filtration to ensure that contaminated air is not recirculated or exhausted to the atmosphere. The Building 731 exhaust system, consisting of a single stage of HEPA filtration and one exhaust fan is also considered part of the General Dry Air System.

The General Dry Air System is designed to minimize the potential for explosive gas buildup and to maintain an oxygen level to sustain human life by providing a sufficient number of air volume changes per hour. During normal operations, the General Dry Air System provides recirculation of about 85% of Building 707/707A's air volume, with the balance of about 15% made up with fresh air from outside the building. Recirculation is accomplished by discharging to and taking suction from the Building 707/707A second-floor equipment room. During abnormal or accident conditions, the General Dry Air System can be operated in a single-pass mode, providing 100% outside air with no recirculation. The building's heating and cooling capacities are based on a single-pass-operating mode.

The Building 707/707A General Dry Air System consists of nine subsystems, each capable of independent operation. Each subsystem includes an inlet filter, dehumidification units (inoperable), heating and cooling coils, a supply fan, a two-stage exhaust HEPA filter unit, two exhaust fans, dampers, and associated instrumentation and controls. The installed but inoperable dehumidification units were previously used to reduce moisture in the air for product quality control during the production mission.

The nine supply side subsystems (excludes 731 Exhaust System) of the General Dry Air System are divided into three functionally similar groups. Systems 1, 2, 3, and 4 discharge into a common header, and four supply subsystems serve the north half of Building 707/707A that include Modules A, B, C, D, and the Health Physics and Radiography Vaults in the east bay. Three supply subsystems discharge into a common header and serve the south half of the building that include Modules E, F, G, H, and the common areas in the Radiological Buffer Area. Two subsystems serve Building 707A that include Modules J and K.

The Building 731 exhaust system is considered to be part of the General Dry Air System. Building 731 has one independent exhaust fan and exhaust HEPA filter and d/P monitoring instrumentation with no alarms. Therefore, exhaust fan operation maintains a negative pressure within Building 731 with respect to the atmosphere. The Building 731 exhaust air stream is filtered by one HEPA filter stage. Outside air is supplied to Building 731 via a HEPA filter installed in the normally closed access door.

The primary Building 778 exhaust systems involve Air Handling Units as typically provided for work areas. However, the chainveyor section transversing the building is exhausted through both the Building 707 and Building 777 Inert Ventilation Systems. A permanent blank has been installed inside the chainveyor to isolate communication between Buildings 707 and 777 via the S8 chainveyor.

The Building 707/707A Inert Ventilation System is described below.

Inert Ventilation System-De-Inerted

Certain gloveboxes, chainveyors, and vaults in Building 707/707A were provided a nitrogen atmosphere to reduce the risk of fire, particularly where pyrophoric plutonium is handled or stored. The Inert Ventilation System maintained this nitrogen atmosphere in such enclosures and provides for recirculation and filtering of the nitrogen atmosphere, while simultaneously maintaining a sufficient negative pressure in the system (Zone I). The oxygen concentration in the Inert Ventilation System was continuously monitored and maintained at a level that will not support combustion. The inert ventilation system has since been de-inerted due to Special Nuclear Material removal efforts associated with deactivation and closure of the material access area. The system pressure is maintained negative with respect to adjacent Zone II areas by controlling a small exhaust flow from the recirculating system.

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The Inert Ventilation System is divided into two subsystems: Inert System 1 serves Modules A, B, and C; and Inert System 2 serves Modules J and K. Each subsystem includes oxygen analyzers (no longer required), two recirculation fans, heating and cooling coils, a four-stage HEPA filter plenum, two exhaust fans, dampers, and associated instrumentation and controls. A standby four-stage HEPA filter plenum, common to both subsystems, allows filter replacement or maintenance without taking an entire subsystem out of service. Cross connections allow the use of the standby filter plenum in order to isolate one plenum (for surveillance or maintenance activities) while maintaining two plenums operational.

During normal operations, the Inert Ventilation System circulates flow through the first two stages of HEPA filters in the four-stage filter plenums, and exhausts only a small portion through all four stages of HEPA filtration to maintain Zone I d/P. Air from the second floor of Building 707/707A (Zone II) can be aligned to any of the filter plenums or the storage vault in Module K. The flow is then exhausted through a four-stage HEPA filter plenum to the atmosphere while air from the second floor is purged into the selected area.

Glovebox Dry Air System

The Glovebox Dry Air System supplies temperature-controlled air to gloveboxes and maintains a sufficient negative pressure within the gloveboxes in Modules D and E (Zone I). This system includes two supply fans, dehumidification units (inoperable), heating coils, inlet filters, an exhaust plenum with four stages of HEPA filters, two exhaust fans, dampers, and associated instrumentation and controls. The installed but inoperable dehumidification units were previously used to reduce moisture in the air for product quality control during the production mission. This system takes air from the Building 707/707A second-floor equipment room and exhausts to the atmosphere.

Dryroom Dry Air System

The Dryroom Dry Air System consists of a supply subsystem and two exhaust subsystems. The supply subsystem takes air from the Building 707/707A second floor equipment room and provides filtered and temperature-controlled air to the dryroom in Module F (Zone II). The supply subsystem includes two supply fans, dehumidification units (inoperable), heating and cooling coils, inlet filters, dampers, and associated instrumentation and controls. The installed but inoperable dehumidification units were previously used to reduce moisture in the air, a function that was important for product quality control during the production mission.

The two exhaust subsystems are functionally similar, one maintaining sufficient airflow velocity in Rooms 125A and 125B in Module F (Zone IA), and the other maintaining Zone II d/P. Each exhaust subsystem includes a four-stage HEPA filter plenum, two exhaust fans, dampers, and associated instrumentation and controls.

J-Air System

The J-Air System exhausts gloveboxes (Zone I) in Module A (A-15), Module J (J-25, J-60), and the drum hood (Zone II) in the C-Cell, via a four-stage HEPA filter plenum. This system was also utilized to de-inert plenums associated with the Inert Ventilation System and the X-Y retriever.

System Boundaries for the HVAC Systems

Mechanical Boundaries: Boundaries include the air intake grills for recirculated air from the equipment room and outside air, air discharge grills, the regenerator scavenger air intake and discharge grills, and the exhaust discharge to the outside atmosphere.

Fire sprinkler piping penetrates the heat chambers and filter sections of all HVAC exhaust filter units and plenums. The boundaries with the sprinkler system are at the outer surface of the piping or nozzles. The filter sections and heat chambers are equipped with process waste drains to prevent accumulation of water. The boundaries for these systems are at the drain penetrations into the filter units or plenums.

The boundary between the HVAC and the Fire Detection and Alarms System is at the penetration of the detector into the duct.

Steam and hot water are supplied to heating coils in the air intake and supply ducts. Steam supply, condensate return, hot water supply, and hot water return piping boundaries are the outer surface of the heating coils.

Ethylene Glycol (Brine) System piping interfaces the HVAC at the outer surface of the HVAC cooling coils.

The Instrument Air and Plant Air System provides air to several HVAC components (e.g., solenoid, damper controller). The end-service (i.e., control loop components) devices receiving instrument air are components of the HVAC. Boundaries for these components are at the inlet port of the end-service devices.

Electrical Boundary: The electrical boundaries for the HVAC occur at the line side of the circuit breaker for supply fans, motor-driven roll filters, control panels, and various instrumentation loads. HVAC controls are backed up with UPS power.

Instrumentation and Controls Boundary: The HVAC boundary encompasses all instruments within a loop and the associated power/control cables up to the line side of the supply breaker. If any breaker powers more than one (1) system, that breaker may share system boundaries.

The Building 707/707A Data Acquisition and Control System (DACS) activates an alarm upon detection of low Zone II DP. The DACS is a special purpose computer that provides a centralized location for the indication of utility system parameters (or field data) and alarms. The DACS automatically generates "hard copy" printouts of alarms. The DACS provides no utility system control functions.

Each HVAC supply fan is interlocked with its associated exhaust fans. These interlocks are all within the HVAC boundary. The instrumentation and controls boundary occurs at the "M-2" relay and contacts within the fan control logic.

HVAC Support Systems

Instrument Air and Plant Air System: Instrument Air supplies clean dry air to various HVAC control loop components. Instrument Air applies the motive forces and control air to the pneumatic components within the HVAC control loops.

Electrical Systems: The Electrical Systems supply electrical power to the HVAC System. The exhaust fans (F-111A, F-111B, F-112A, F-112B, F-114A, F-114B, F-115A, F-115B, F-116A, F-116B, F-117A, F-117B, F-118A, F-118B) receive power from the electrical systems. Electrical power is backed up with the UPS and the diesel generators. Backup power is supplied to the HVAC controls and supply fans F-4, F-5, F-11, F-12, F-20, F-22, F-24, F-26, F-28, F-30, F-32, F-61, F-62, F-63, and F-64.

Additional HVAC support systems are the Steam and Condensate System and Ethylene Glycol (Brine) System.

Interfaces for the HVAC Systems

The following systems interface with the HVAC:

- HVAC Confinement Enclosures System.
- Airborne Radioactivity Monitoring System.
- Electrical Systems.
- Instrument Air and Plant Air System.
- Cooling Water System.

- Brine System.
- Fire Detection and Alarms System.
- Fire Systems.
- Steam and Condensate System.
- Process Waste System.

2.3.3.3 Criticality Accident Alarm System (CAAS)

The CAAS is designed to detect a criticality event and provide audible and/or visual alarms to alert personnel. This system includes neutron detectors, a criticality alarm display panel (located in Building 750), warning beacons and strobes, and an audible tone generator. This system provides an audible alarm signal to the LS/DW System, as well as alarm and trouble signals to the Central Alarm Station (CAS) in Building 121.

Each area where there is a potential for a criticality accident is covered by a minimum of three neutron detectors. This coverage provides for redundancy and continued operability with a single-detector failure. If any two or more detectors alarm (this reduces the possibility of false alarms from a single detector), the criticality alarm display panel activates the audible tone generator that is broadcast over the LS/DW System. Warning beacons and strobes are also activated. The criticality alarm panel can be powered by the diesel generators and has internal batteries that provide 4 hours of operation in the event that all ac power is lost.

The LS/DW System is a multiple-input, Sitewide public address system used to provide audible alarms and to make emergency and general announcements over speakers installed throughout Building 707/707A/778. The LS/DW System is used to alert personnel to hazardous situations, such as an inadvertent criticality, airborne contamination, fires, emergency response activities, or impending natural disasters, as well as to provide general information to Site personnel. A relay circuitry gives top priority to a criticality alarm that will interrupt all other inputs or announcements.

This system includes amplifiers, relays, wiring, microphones, speakers, and horns. The LS/DW System can be powered by the diesel generators and has a battery backup that will maintain the system fully operable for a minimum of 4 hours in the event that all ac power is lost.

Due to Building 778's location within the 12-rad boundaries of both 707/707A and 776/777; both, the LS/DW and the CAAS are maintained to alert Building 778 personnel of a criticality within either of the adjacent Buildings. Building 778's CAAS system has been connected directly into Building 707/707A's CAAS panel, while the LS/DW system is essentially shared. Nominally half of the speakers in Building 778 are connected to Building 707/707A's system with the remainder connected to 776/777. This allows CAAS alarms from either Building to be heard throughout 778 in the event criticality emergency response actions are required for Building 778.

System Boundaries for the CAAS

Electrical Boundaries: The Electrical Systems provide nominal 120-V ac power to the CAAS main panel internal power supply and battery charger as well as to the criticality warning strobe lights. The boundary of the CAAS main panel with the Electrical Systems is on the line side of Emergency Lighting Panel ELP1B-105, ckt. 8. The boundary of the criticality warning strobe lights with the Electrical Systems is on the line side of Emergency Lighting Panels ELP1D-11A ckt. 11 and ELP1D-7A ckts. 8, 11, and 12. The Building 778 strobe lights are energized by ELP1D-7A ckt. 12.

LS/DW System Boundaries: The LS/DW System provides the audible warning for building evacuation in the event of a criticality. The LS/DW System provides amplification, distribution, and annunciation of the criticality audible alarms. The LS/DW boundary is at the output wires of the Digital Announcement Device located inside the LS/DW amplifier cabinet in Room 161. Power for the Digital Announcement Device is provided from the LS/DW power supply. In the event 120-V ac power is lost, dedicated battery backup will automatically supply the LS/DW System load. The Digital Announcement Device is considered to be part of the CAAS.

Central Alarm Station Honeywell System Boundary: The CAS Honeywell system provides a remote status of the CAAS output. The CAS receives indication of trouble alarms and general building evacuation alarms. The boundary with this system is at the output side of Terminal Board #2 (TB-2) in the CAAS main panel. The Signal Input/Output (SIO) panels are considered part of the Honeywell system.

CAAS Support Systems

LS/DW System: The LS/DW System is required for the CAAS to provide criticality accident alarm audible notification. The CAAS provides the criticality accident alarm tone signal, which is amplified and broadcast by the LS/DW System.

Electrical Systems: This system is required for operability of the CAAS. If ac power is lost, the CAAS contains internal batteries that will maintain power to the panel and detectors for a minimum of four hours or until backup power takes over or Site power is restored.

Interfaces with the CAAS

The following SSCs interface with the CAAS and directly support its function:

- Life Safety/Disaster Warning (LS/DW) System.
- Electrical Systems.
- CAS Honeywell System.

2.3.3.4 Fire Systems

The Fire Systems for Building 707/707A/778 consists of the following subsystems: an automatic wet-pipe sprinkler system, a filter plenum deluge system, a cooling tower deluge system, the Fire Detection and Alarm System, portable fire extinguishers, and fire hose stations. Simplified drawings of Building 707/707A risers and sprinkler system and the filter plenum deluge system are presented in Figures 2-4 and 2-5, respectively.

An automatic wet-pipe sprinkler system is provided for all operational areas (except for some Pu storage vaults and those areas identified in the *Fire Hazards Analysis (FHA)* (Ref. 2-5) within Buildings 707/707A, 778, and 708. Heat from a fire will cause individual sprinkler heads in the area to open, allowing water to flow onto the fire, thereby reducing its heat-release rate and preventing its growth. Flow of water through the sprinkler system is detected by the Fire Detection and Alarm System that initiates an alarm to the Fire Dispatch Center (FDC). In addition, each sprinkler system includes a water motor gong that will alarm locally outside the building.

The filter plenum deluge system is designed to protect the HEPA filters in the HVAC Systems from excessive temperatures and hot embers. The system consists of open nozzles on a piping system located within the heat chambers in the HVAC Systems. Heat detectors in the Fire Detection and Alarm System provide a signal to open a deluge valve that sends water through the nozzles. This system can also be manually activated. An additional manual spray system also exists with nozzles located directly in front of the 1st stage HEPA filters.

The cooling tower deluge system is a dry-pilot sprinkler system that employs closed sprinkler heads and piping filled with pressurized air. Heat from a fire will actuate a sprinkler head, releasing the pressurized air and thereby cause a deluge valve to open to deliver water to the open sprinkler heads. The Fire Detection and Alarm System detects the flow of water through the sprinkler system initiating an alarm to the FDC.

The Fire Detection and Alarm System includes detection devices (select gloveboxes), annunciation devices, fire phones, and associated panels and circuitry. This system continuously monitors building areas to detect fires. When a fire is detected, the system provides local and remote alarm signals to warn personnel and to activate the appropriate portion of the Fire Systems. The Fire Detection and Alarm System can be powered by the diesel generators (e.g., in the event that offsite power sources are lost). Each fire panel has batteries or is connected to an uninterruptible power supply (UPS) that provides 4 hours of backup power to allow for continuous operation when other power sources are lost or switched.

The detection devices consist of glovebox heat detectors, storage tray contact heat detectors, HVAC filter plenum inlet duct heat detectors, and sprinkler water-flow detectors. Local audible alarms are provided throughout Building 707/707A/778. Alarm signals also actuate applicable portions of the Fire Systems, and provide a signal to the FDC. Fire phones located throughout Building 707/707A/778 can also be used to provide voice communication with the FDC during an emergency.

Building 707/707A/778 Fire Systems receive water from the Site Domestic Cold Water System through interconnecting piping between the water mains and the building risers. Site engineering controls, found in the Site SAR, ensure the availability of firewater at the required flows and pressures to satisfy water demands.

Portable fire extinguishers are located in readily accessible areas throughout Building 707/707A. The type of fire extinguishers provided is determined by the class of fire most likely to occur in a particular area. There are also numerous wet-standpipe hose stations located throughout Building 707/707A/778, although no fire hoses are installed. The Rocky Flats Fire Department procedures call for carrying hoses into the building if an interior hose stream is needed.

System Boundaries with the Fire Systems

The Building 707/707A/778 Fire Systems boundaries include the fire water supply, the automatic sprinkler systems, the plenum deluge system, and all the associated valves [including Pilot Indicating Valves (PIVs)], piping, sprinkler heads, nozzles, and hose connections.

The check valve in the nitrogen supply line immediately upstream of the cooling tower deluge pilot air system is the boundary between the Fire Systems and the plant nitrogen system.

Fire Systems Support Systems

A water flow detection switch installed on the Fire Systems risers provides a signal to the Fire Detection and Alarm System for alarm annunciation.

Fire Detection and Alarm System: Heat detectors in the Fire Detection and Alarm System provide a signal to actuate the plenum deluge valves upon detection of an excessive temperature or rate of temperature rise.

Combination Fire/Domestic Cold Water (F/DCW) System: The combination F/DCW System supplies water to the Fire Systems in Building 707/707A/778. The Fire Systems interface with the F/DCW System where the fire water lead-in lines connect to the combination F/DCW main.

Electrical Systems: The Building 707/707A Electrical Systems supply electrical power to the deluge control panels. The Fire Systems interface with the Electrical Systems at the line side of the electrical isolation device that supplies power to the deluge control panels.

Interfaces with the Fire Systems

An interface is any connection or influence on the system of concern. The following Building 707/707A systems interface with the Fire Systems:

- Fire Detection and Alarm System.
- HVAC Systems (deluge system penetrations and supports).
- Process waste and associated systems that provide run-off capabilities for the Fire System, including the plenum drains.
- Building Structures.
- Fire and Domestic Cold Water (F/DCW) System.
- Electrical Systems.

2.3.3.5 Electrical Systems

There are essentially three electrical power sources that serve Building 707/707A: (1) Site power is from offsite sources via a Site distribution network; (2) UPS is from batteries to selected loads; and (3) additional power is provided from the diesel generators to selected loads. The Site power and diesel generator power sources and associated systems are illustrated in Figure 2-6 and described in the following subsections.

Site Power Distribution System

The Site Power Distribution System normally provides power to Building 707/707A electrical loads. Two offsite 115-kV ac power lines supply the Site ac ring bus. Site substations transform the 115-kV ac to 13.8-kV ac that the Building 707/707A transformers step down to 2400-V ac or 480-V ac for distribution to the switchgear. Power is automatically transferred to the other source should a fault occur in one of the offsite sources.

UPS System

The UPS provides continuous power to certain loads during the transition from offsite power to the diesel generator power that would otherwise involve a loss of power for several seconds. This system consists of an UPS module, battery bank, and a distribution network.

The UPS module contains a rectifier that converts ac power from Site power systems into a direct current (dc) output that normally feeds an inverter and maintains a float charge on the battery bank. The dc power is then inverted to ac power that is supplied to the loads connected to the UPS. Following a loss of offsite power, the batteries continue to power the dc-to-ac inverter until diesel generator power becomes available or the batteries are discharged. The UPS batteries were originally designed to supply connected loads for up to 15 minutes.

Diesel Generators

The diesel generators provide 480-V ac power to certain equipment in Building 707/707A in the event that all Site power is lost. In such an event, all loads except those provided with an UPS are de-energized, and two diesel generators (nominal 1,000 kW and 444 kW) automatically start and sequentially connect to Building 707/707A emergency buses. The Building 707/707A diesel generators also provide power for the Building 776 CAAS. A third diesel generator shares the same location, air starting, and fuel storage, but powers the Perimeter Intrusion Detection Assessment System (PIDAS) that is not considered part of Building 707/707A.

Major components of the diesel generators are the diesel engines, generators, switchgear, and automatic transfer circuitry. Equipment that can be powered by the diesel generators includes HVAC fans, an air compressor, radiation monitoring equipment, the Fire Detection and Alarm System, LS/DW System equipment, lighting, and other components supporting worker safety and safe shutdown of operations, as well as the Building 776 CAAS. The diesel engines are maintained in a stand-by condition with lubricating oil and coolant preheated to promote fast starts and loading without a warm-up period.

A sufficient inventory of diesel fuel is maintained in a common storage tank to allow operation of all three-diesel generators for 24 hours. The engines are started by air motors with a system of air compressors, receivers, and piping providing air at a sufficient volume and pressure to start all three engines.

Interfaces with the Electrical Systems

The Building 707/707A Complex Electrical Systems interface with the Site Power Distribution System on the Building 707/707A Complex feed-side of the Site transformers. The Electrical Systems interfaces with various Building 707/707A Complex loads at the line side of the electrical isolation device that supplies power to the load.

2.4 REFERENCES

2-1. *Rocky Flats Environmental Technology Site SAR*, Volume I: Site Description and Characteristics, Kaiser-Hill, LLC, Rocky Flats Environmental Site (RFETS), Golden, CO, Feb. 7, 2001.

2-2. *Rocky Flats Cleanup Agreement*, Colorado Department of Public Health and Environment, July 19, 1996.

2-3. *Final SAR – Building 707* (707 FSAR), Stone & Webster Engineering Corporation for EG&G Rocky Flats, Inc., RFETS, Golden, CO, 1987.

2-4. UCRL-15910, *Design and Evaluation Guidelines for DOE Facilities Subjected to Natural Phenomena Hazards*, The Office of the Assistant Secretary for Environment, Safety, & Health, Office of Safety Appraisal, U. S. Department of Energy, June 1990.

R4-02 2-5. FHA-707-002, *Building 707 Complex Fire Hazards Analysis*, Rev. 5, June 2002.

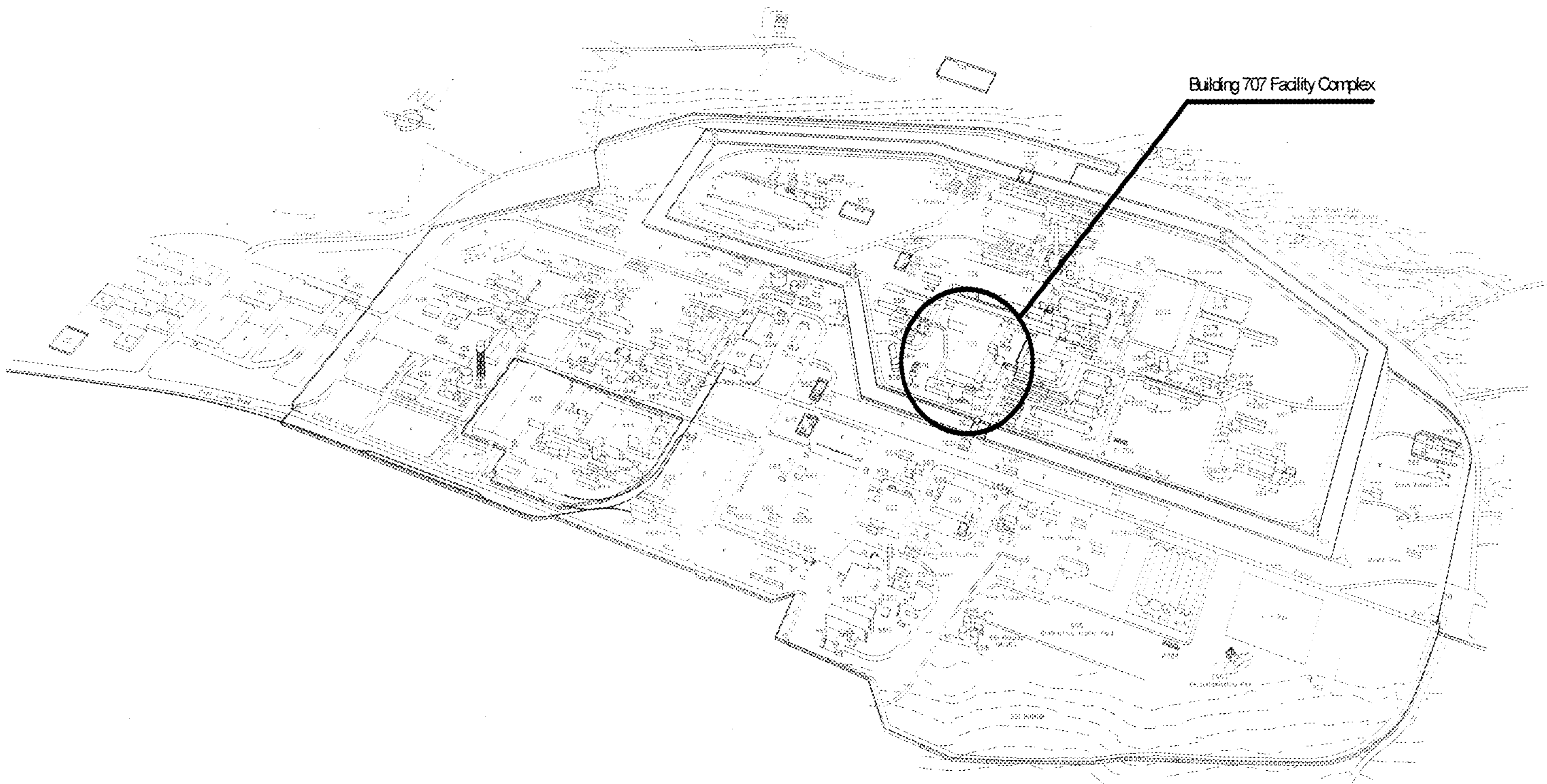

FIGURE 2-1. MAJOR FACILITIES WITHIN THE INDUSTRIAL AREA OF THE SITE

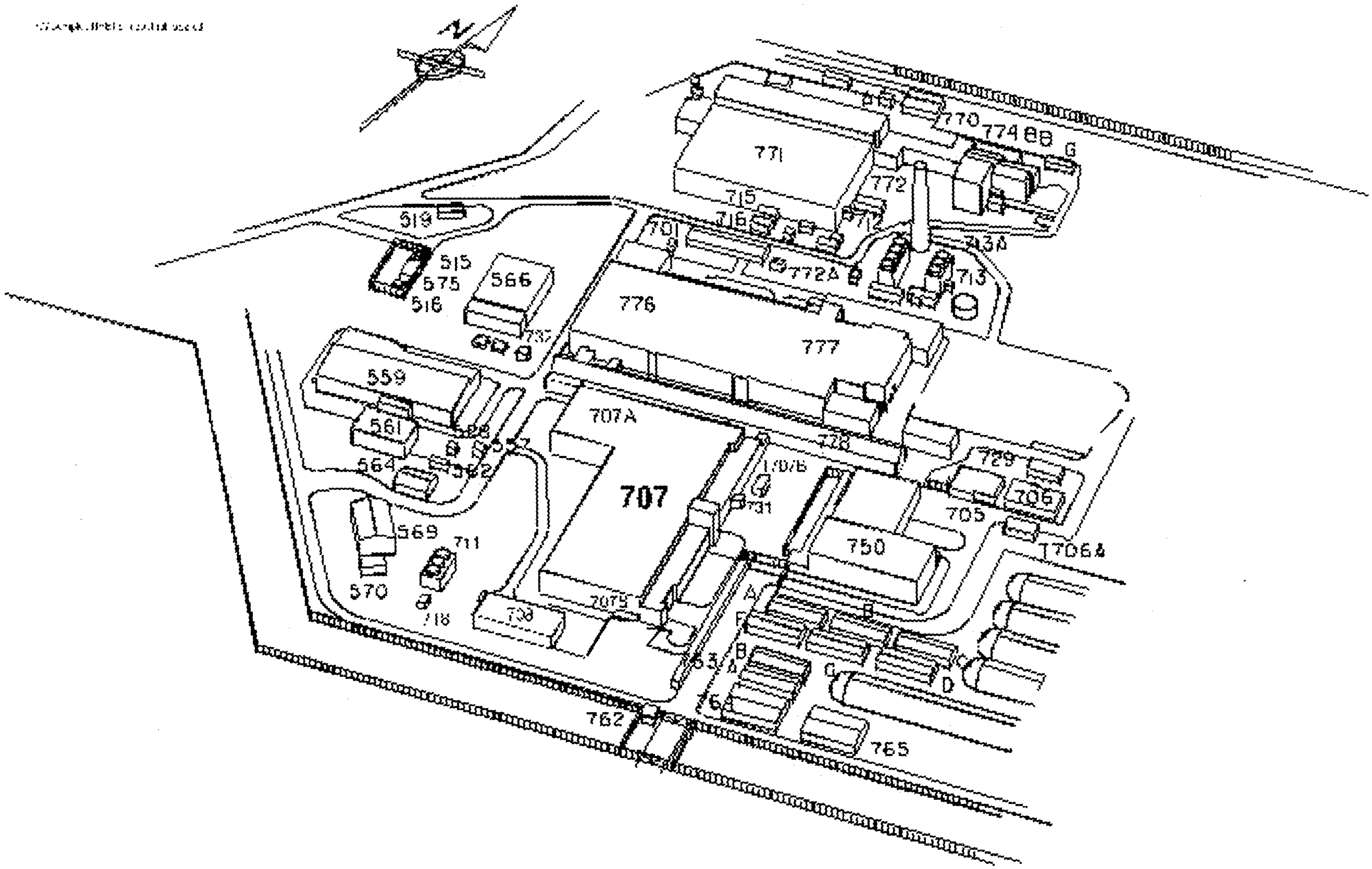

FIGURE 2-2. THE BUILDING 707 COMPLEX WITHIN THE SITE INDUSTRIAL AREA

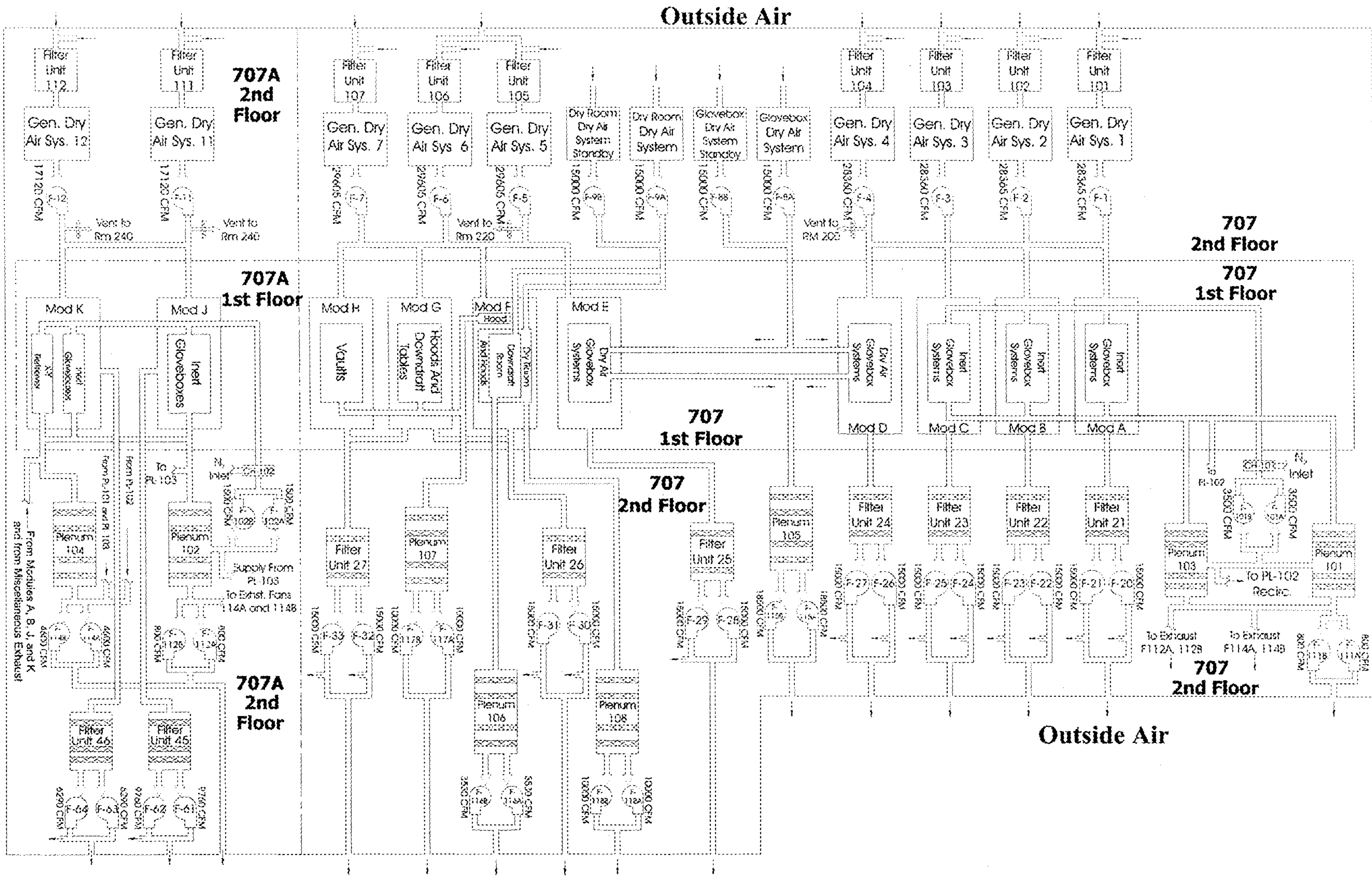

FIGURE 2-3. SIMPLIFIED COMPOSITE DIAGRAM OF THE BUILDING 707 HVAC SYSTEMS

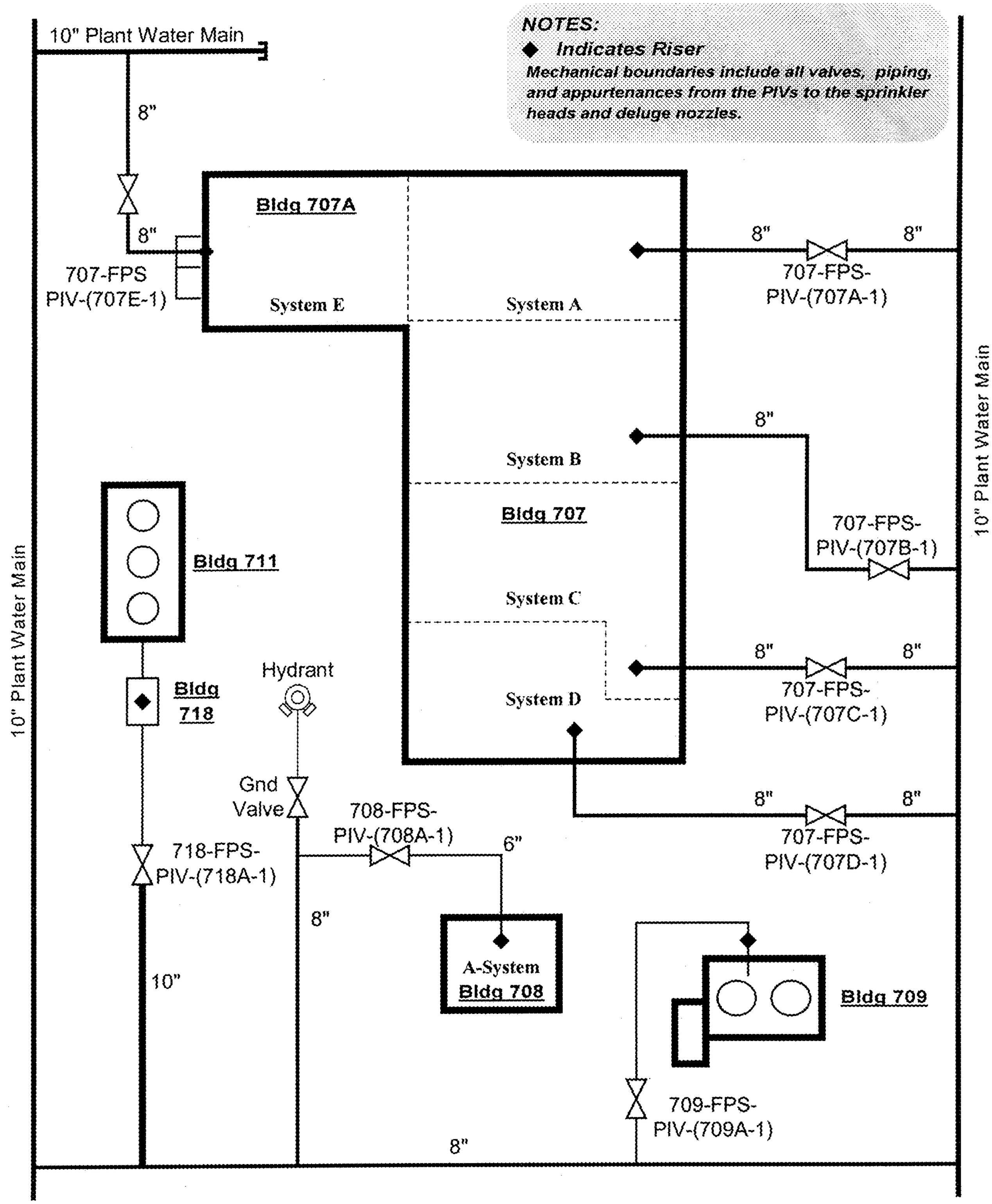

FIGURE 2-4. BUILDING 707/707A COMPLEX RISERS AND SPRINKLER SYSTEM

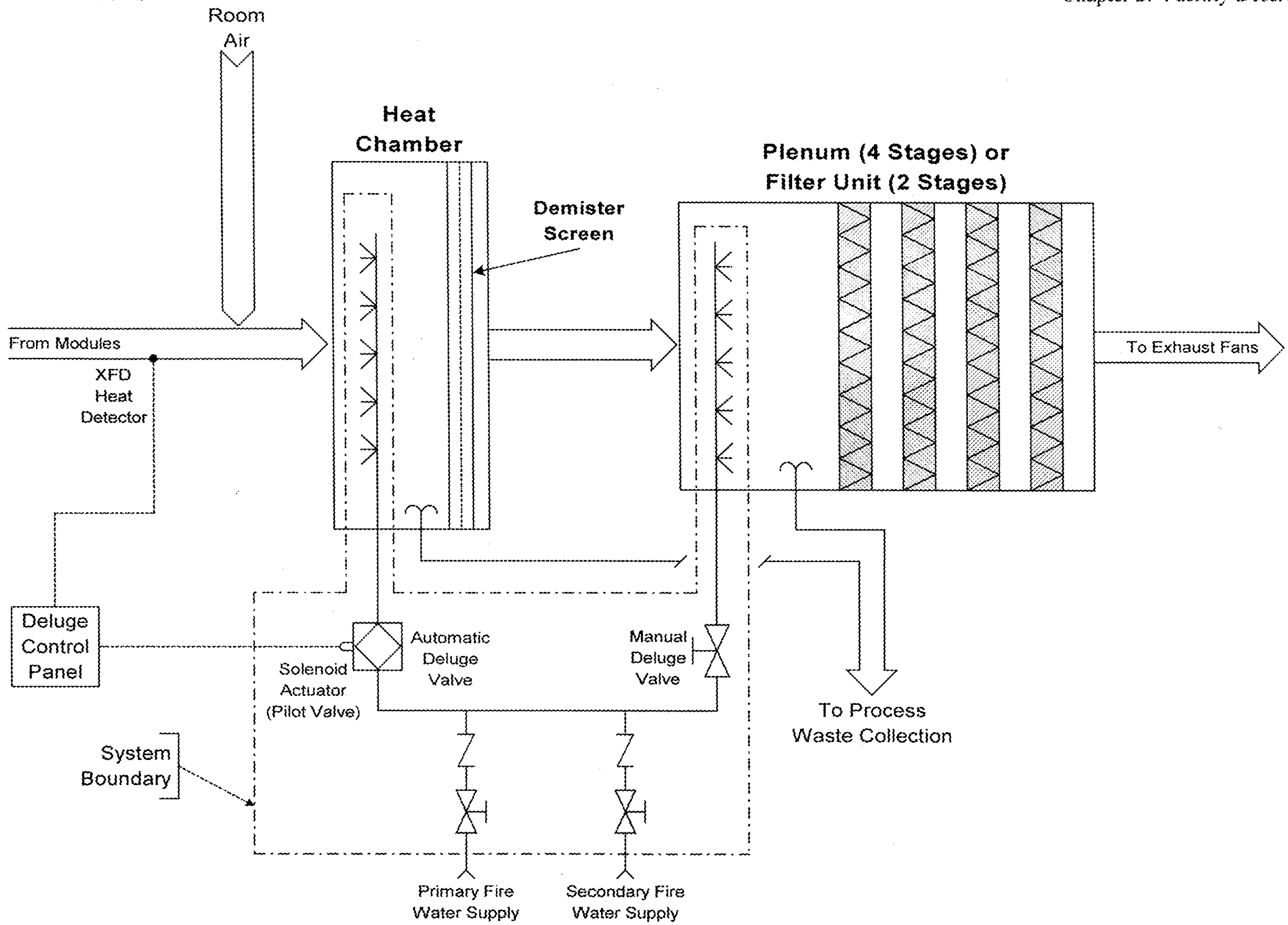

FIGURE 2-5. SIMPLIFIED COMPOSITE DIAGRAM OF BUILDING 707 TYPICAL FILTER PLENUM DELUGE SYSTEM

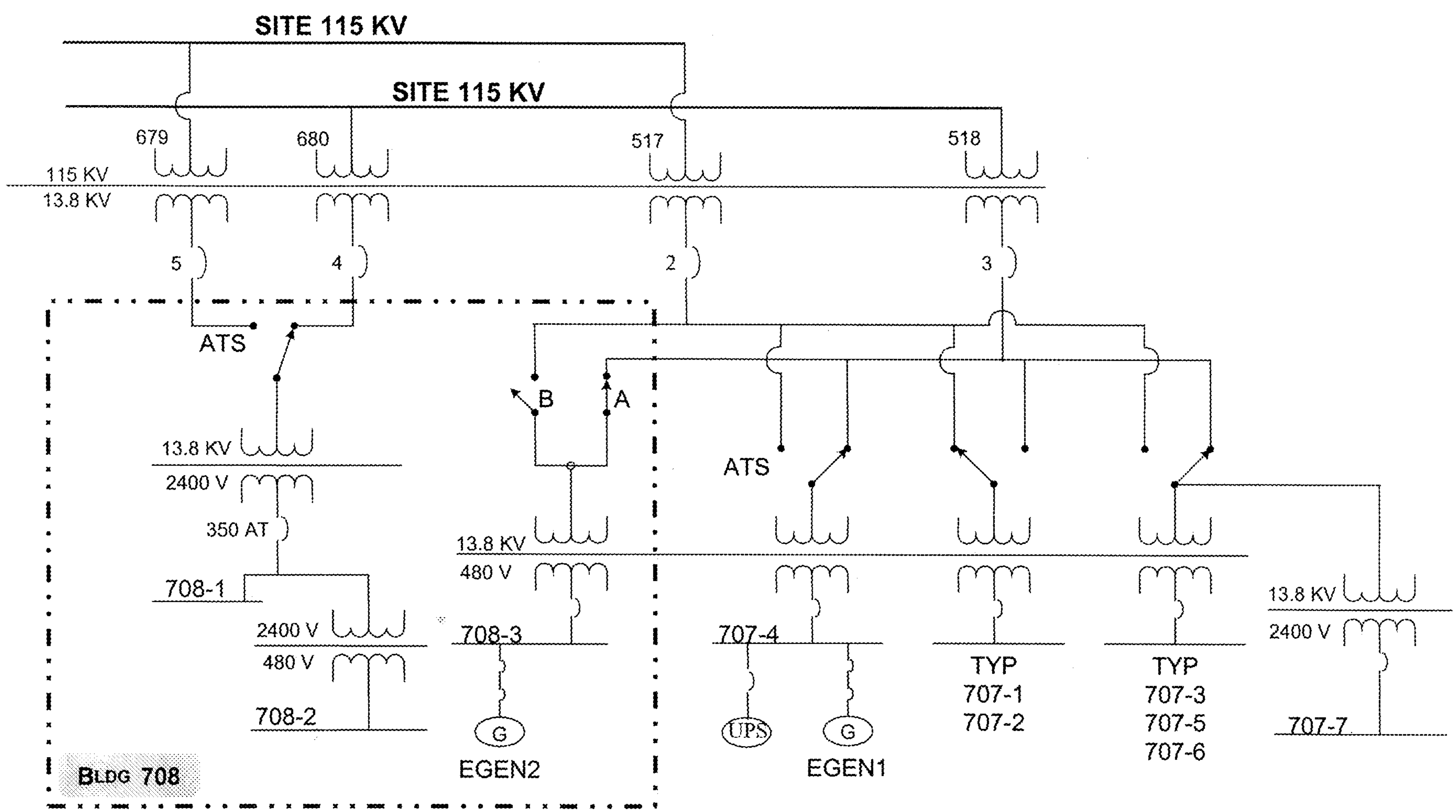

FIGURE 2-6. SIMPLIFIED COMPOSITE DIAGRAM OF BUILDING 707 ELECTRICAL DISTRIBUTION